APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/790,169	03/01/2004	Adrian C. Moga	BEA920030024US1	1020

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EXAMINER
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ART UNIT	PAPER NUMBER
2185	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/790,169	MOGA ET AL.
	Examiner	Art Unit
	Zhuo H. Li	2185

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _21 April 2007_.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-17_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-17_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Response to Remark

1.   Applicant's request for reconsideration of the finality of the rejection of the last Office

action is persuasive and, therefore, the finality of that action is withdrawn.

2.   This Office action is in response to Applicant's Remark file on 4/21/2007, claims 18-21

are canceled, and claims 1-17 are pending in the application.

Claim Rejections - 35 USC § 102

3.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed
> in the United States before the invention by the applicant for patent or (2) a patent granted on an application for
> patent by another filed in the United States before the invention by the applicant for patent, except that an
> international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this
> subsection of an application filed in the United States only if the international application designated the United
> States and was published under Article 21(2) of such treaty in the English language.

4.   Claims 1-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Weber (US PAT.

6,631,448).

Regarding claim 1, Weber discloses a cache-coherent system (figure 3) comprising a

memory having a plurality of memory units (1910, figure 3), a plurality of nodes (1920, 1930,

1940 and 1950) employing a coherence protocol to maintain cache coherence of the memory

(cool. 5 lines 33-54), a cache (1942, figure 3) within each node, i.e., local node (1940, figure 3)

to temporarily store contents of the plurality of memory units (col. 5 lines 33-54), and logic

within each node, i.e., mesh coherence unit (1911, 1943, and 130 in each of node, respectively

(col. 5 lines 18-25), to determine whether a cache miss relating to a memory unit, i.e., local node

memory (1940, figure 3) should be transmitted to a sub-plurality of nodes, i.e., home node, or

owner node based on the status stored in the coherence directory (140, figure 3) and (col. 5 line

33 through col. 6 line 6 and col. 6 lines 7-40), lesser in number than the plurality of nodes but

greater than one, i.e., when the requested cache line indicated one of the remote node stores the

most updated requested cache line, the home node will communicate with the remote node

selectively based upon which nodes have accessed the line rather than to all nodes within the

multiple node system, (col. 5 line 55 through col. 6 line 3), based on a criteria, i.e., status

information of the requested cache line stored in the coherence directory of the requesting node

(col. 5 lines 55 through col. 6 line 40).

Regarding claim 2, Weber discloses the system wherein the criteria includes whether, to

ultimately reach an owning node for the memory unit (col. 5 line 55 through col. 6 line 3), such

transmission is likely to reduce total communication traffic among the plurality of nodes and

unlikely to increase latency as compared to broadcasting the cache miss to all of the plurality of

nodes.

Regarding claim 3, Weber discloses the system wherein the logic, i.e., mesh coherent unit

(130) within each node is to determine whether the node is a home node for the memory unit to

which the cache miss relates in determining that transmission to the sub-plurality of node lesser

in number than the plurality of nodes is likely to reduce total communication traffic among the

plurality of nodes and unlikely to increase latency to ultimately reach the owning node for the

memory unit, i.e., the mesh coherent unit in each of the node in communicate with its coherency

directory unit (140), and based on the status of each cache line stored in the coherence directory

unit to determining which node contains the valid requested cache line (col. 5 lines 18 through

col. 6 line 3).

Regarding claim 4, Weber discloses the system wherein the sub-plurality of nodes

comprises an owning node (1930, figure 3) for the memory unit as stored at a directory (140,

figure 3) of the home node (1920, figure 3).

Regarding claim 5, Weber discloses the system wherein the logic, i.e., mesh coherent unit

(130) within each node (figure 3) to determine whether the cache of the node has stored a hint, as

to a potential owning node for the memory unit as a result of an earlier event in determining that

transmission to the sub-plurality of nodes lesser in number than the plurality of nodes is likely to

reduce total communication traffic among the plurality of nodes and unlikely to increase latency

to ultimately reach the owning node for the memory unit (col. 5 line 33 through col. 6 line 40

and col. 6 line 60 through col. 7 line 10).

Regarding claim 6, Weber discloses the system wherein the event includes an

invalidation of the memory unit by the potential owning node (col. 6 lines 8-49).

Regarding claim 7, Weber discloses the system wherein the sub-plurality of nodes

comprises a home node (1920, figure 3) of the memory (1910, figure 3), and the potential

owning node (1930, figure 3) for the memory unit (figure 3).

Regarding claim 8, Weber discloses the system wherein the logic, i.e., mesh coherent unit

(130), within each node is to determine whether the memory unit relates to a predetermined

memory sharing pattern encompassing the one or more nodes in determining that transmission to

the one of more nodes lesser in number than the plurality of nodes is likely to reduce total

communication traffic among the plurality of nodes and unlikely to increase latency to ultimately reach the owning node for the memory unit, i.e., the mesh coherent unit in each of the node in communicate with its coherency directory unit (140), and based on the status of each cache line stored in the coherence directory unit to determining which node contains the valid requested cache line (col. 5 lines 18 through col. 6 line 3).

Regarding claim 9, Weber discloses a method comprising determining at a first node, i.e., requesting node (1940, figure 3) whether a cache miss relating to a memory unit of a shared memory system of a plurality of nodes (col. 5 line 33 through col. 6 line 3 and col. 6 lines 8-49) including the first node and employing a coherence protocol should be selectively broadcast to a sub-plurality of nodes lesser in number than the plurality of nodes but greater than one, i.e., when the requested cache line indicated one of the remote node stores the most updated requested cache line, the home node will communicate with the remote node selectively based upon which nodes have accessed the line rather than to all nodes within the multiple node system, (col. 5 line 55 through col. 6 line 3), based on a criteria, i.e., status information of the requested cache line stored in the coherence directory of the requesting node (col. 5 lines 55 through col. 6 line 40), in response to determining that the cache miss should be selectively broadcast to the sub-plurality of nodes, selectively broadcasting the cache miss by the first node to the sub-plurality of nodes (col. 5 line 55 through col. 6 line 3 and col. 6 lines 8-49, and col. 6 line 60 through col. 7 line 10).

Regarding claim 10, Weber discloses a method further comprising in response to determining that the cache miss should not be selectively broadcast to the sub-plurality of nodes, broadcasting the cache miss by the first node to all the plurality of nodes, i.e., network request

send out by the local node with snooping request to each of node in the multiple node system
(col. 6 lines 8-49).

Regarding claim 11, the limitations of the claim are rejected as the same reasons set forth
in claim 2.

Regarding claim 12, Weber discloses a method wherein determining whether the cache
miss should be selectively broadcast to the sub-plurality of nodes comprises determining whether
the first node is a home node (1920, figure 3) for the memory unit, such that selectively
broadcasting the cache miss to the sub-plurality of nodes comprises selectively broadcasting the
cache miss to one node of the plurality of nodes as an owning node (1930, figure 3) for the
memory unit as stored at a directory (140) of the first node as the home node for the memory unit
(col. 5 line 55 through col. 6 line 3 and col. 6 lines 8-49).

Regarding claim 13, the limitations of the claim are rejected as the same reasons set forth
in claim 5.

Regarding claim 14, the limitations of the claim are rejected as the same reasons set forth
in claim 8.

Regarding claim 15, the limitations of the claim are rejected as the same reasons set forth
in claim 9.

Regarding claim 16, Weber discloses a method comprising determining at a first node,
i.e., local node (1940, figure 3) whether a cache miss relating to a memory unit (1910) of shared
memory system, i.e., multiple node system (figure 3) of a plurality of nodes (1920, 1930, 10940
and 1950, figure 3) including the first node should be selectively broadcast to a sub-plurality of
nodes of the plurality of nodes, based on whether the first node is a home node (1920, figure 3)

for the memory unit or whether the first node has a pre-stored hint, i.e., status of cache line

stored in the directory (140), as to a potential owning node for the memory unit (col. 5 line 33

through col. 6 line 3), in response to determining that the cache miss should be selectively

broadcast to the sub-plurality of nods, selectively broadcasting the cache miss by the first node to

the sub-plurality of nodes (col. 5 line 55 through col. 6 line 3 and col. 6 lines 8-34), otherwise,

determining at the first node whether the memory unit relates to a predetermined memory

sharing pattern encompassing a sub-plurality of the plurality of nodes smaller in number than the

plurality of nodes (col. 5 line 55 through col. 6 line 3), and in response to determining that the

memory unit relates to the predetermining memory sharing pattern, selectively broadcasting the

cache miss by the first node to the sub-plurality of the plurality of nodes (col. 6 lien 8 through

col. 7 line 10).

Regarding claim 17, Weber discloses a node of a system having a plurality of nodes

(1920, 1930, 1940, and 1950, figure 3) comprising local memory (1910, figure 3) for which the

node is a home node (1920, figure 3) and that is shared among the plurality of nodes (figure 3), a

directory (140) to track which of the plurality of nodes has cached or modified the local memory

of the node (col. 5 lines 18-25), a cache (1920, figure 3) to temporarily store contents of the local

memory and memories of other ones of the plurality of nodes (col. 5 lines 33-46), and logic, i.e.,

mesh coherent unit (130), to determine whether a cache miss relating to a local memory should

be transmitted to a sub-plurality of nodes lesser in number than the plurality of nodes but greater

than one based on whether, to ultimately reach an owning node for the local memory, such

transmission is likely to reduce total communication traffic among the plurality of nodes and

unlikely to increase latency as compared to broadcasting the cache miss to all of the plurality of

nodes, i.e., when the requested cache line indicated one of the remote node stores the most

updated requested cache line, the home node will communicate with the remote node selectively

based upon which nodes have accessed the line rather than to all nodes within the multiple node

system, (col. 5 line 55 through col. 6 line 3).

Response to Arguments

5.   Applicant's arguments with respect to claims 1-17 have been considered but are moot in

view of the new ground(s) of rejection.

Conclusion

6.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

        Janakiraman et al. (US PAT. 6,704,842) discloses multiple processor system with

proactive speculative data transfer (abstract).

        O'Krafka et al. (US PAT. 7,174,430) discloses bandwidth reduction technique using

cache-to-cache transfer prediction in a snooping-based cache-coherent cluster of multiprocessing

nodes (abstract).

7.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Zhuo H. Li whose telephone number is 571-272-4183. The

examiner can normally be reached on Mon - Fri 10:00am - 6:30pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sanjiv Shah can be reached on 571-272-4098. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

8.   Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Zhuo H. Li

Patent Examiner
April 27, 2007

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